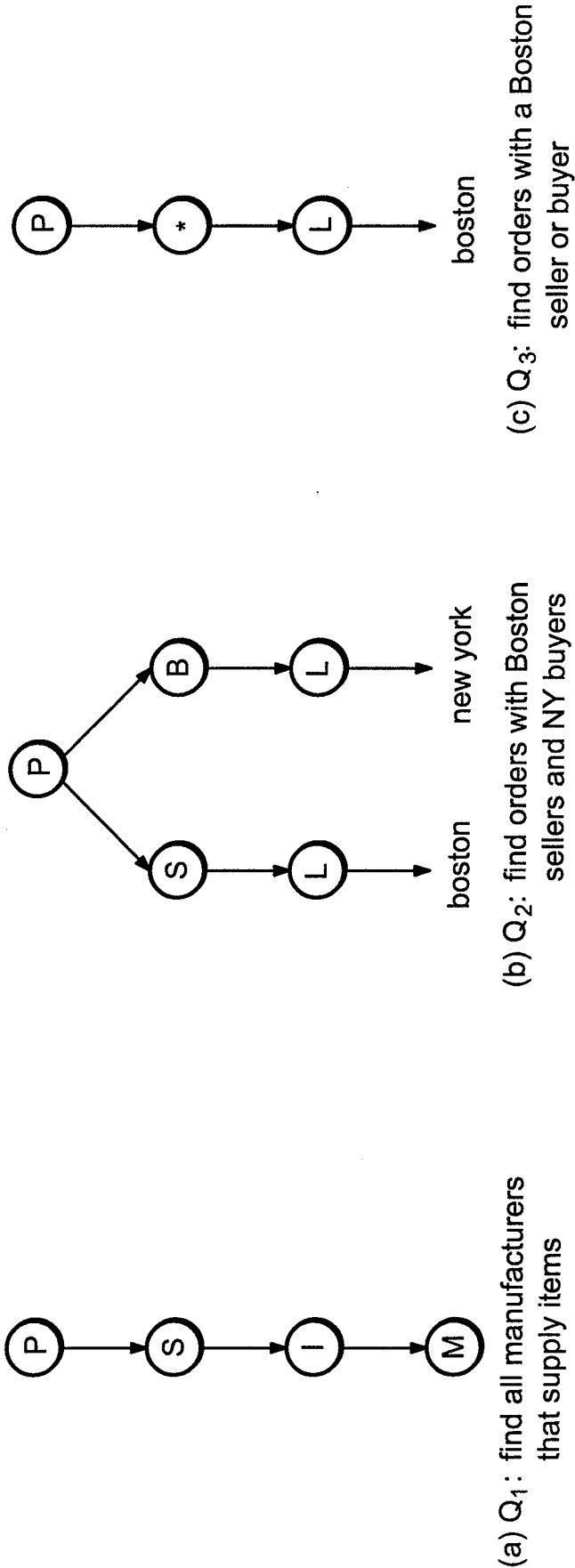


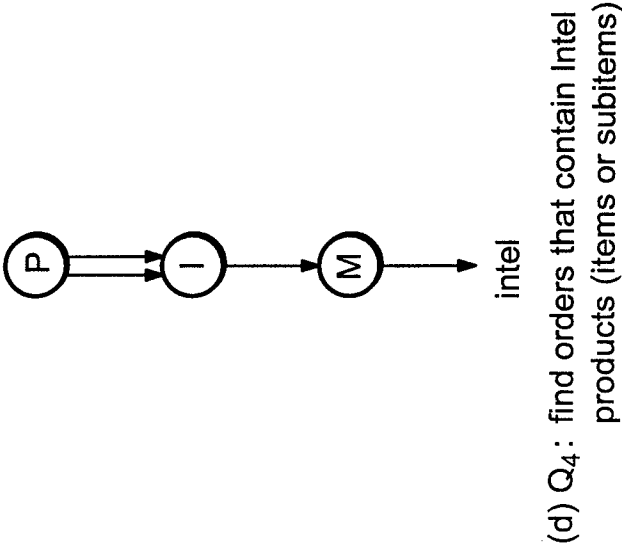
100 →

<!ELEMENT	purchases	(purchase*)>>
<!ELEMENT	purchase	(seller, buyer)>>
<!ATTRIST	seller	ID ID location CDATA name CDATA >
<!ELEMENT	seller	(item*)>>
<!ATTRIST	buyer	ID ID location CDATA name CDATA >
<!ELEMENT	item	(item*)>>
<!ATTRIST	item	name CDATA manufacturer CDATA >

(Prior Art)
FIG. 1



(Prior Art)
FIG. 2



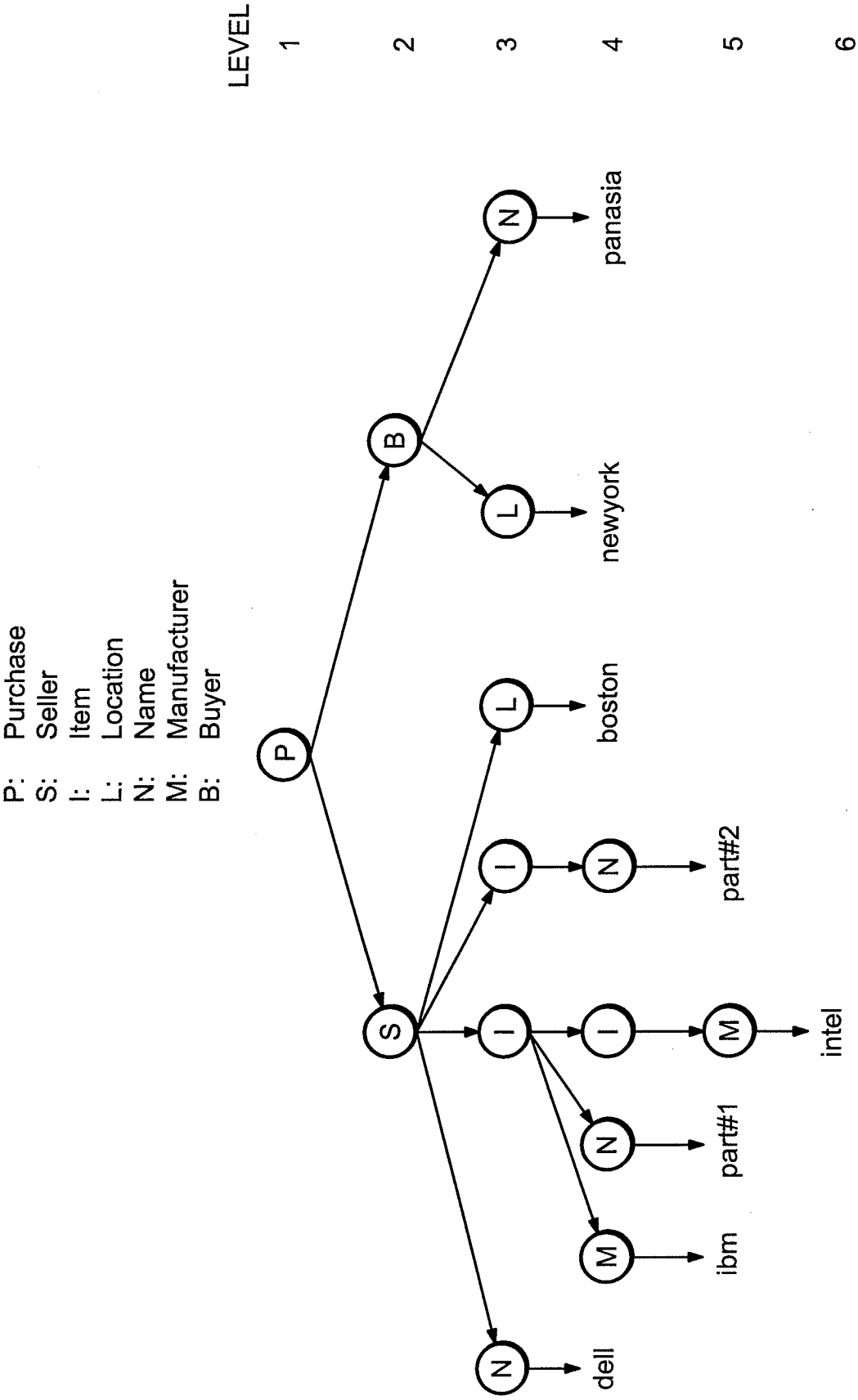
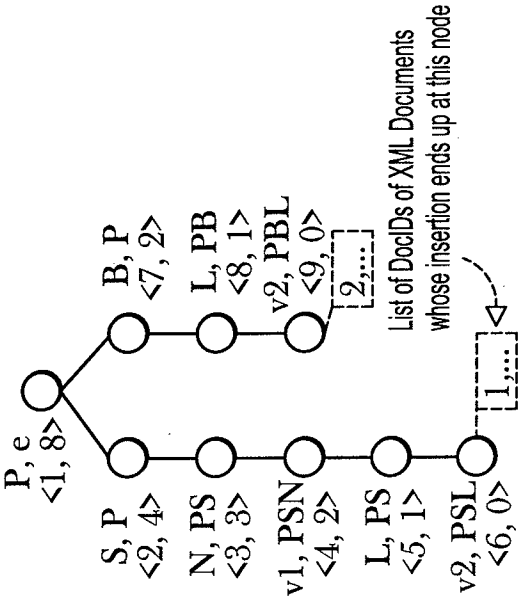


FIG. 3

$$\mathcal{D} = \begin{aligned} & \underline{(P, \epsilon)}, \underline{(S, P)}, \underline{(N, PS)}, (v_1, PSN), (I, PS), (M, PSI), \\ & (v_2, PSIM), (N, PSI), (v_3, PSIN), (I, PSI), (M, PSII), \\ & (v_4, PSIIM), (I, PS), (N, PSI), (v_5, PSIN), \underline{(L, PS)}, \\ & \underline{(v_6, PSL)}, \underline{(B, P)}, \underline{(L, PB)}, \underline{(v_7, PBL)}, \underline{(N, PB)}, (v_8, PBN) \end{aligned}$$

FIG. 4



(b) A tree structure for Doc_1 and Doc_2

$Doc_1 : (P, \epsilon)(S, P)(N, PS)(v_1, PSN)(L, PS)(v_2, PSL)$
 $Doc_2 : (P, \epsilon)(B, P)(L, PB)(v_2, PBL)$
 $Q_1 : (P, \epsilon)(B, P)(L, PB)(v_2, PBL)$
 $Q_2 : (P, \epsilon)(L, P^*)(v_2, P^*L)$

(a) XML docs and queries in structure-encoded sequences

FIG. 5

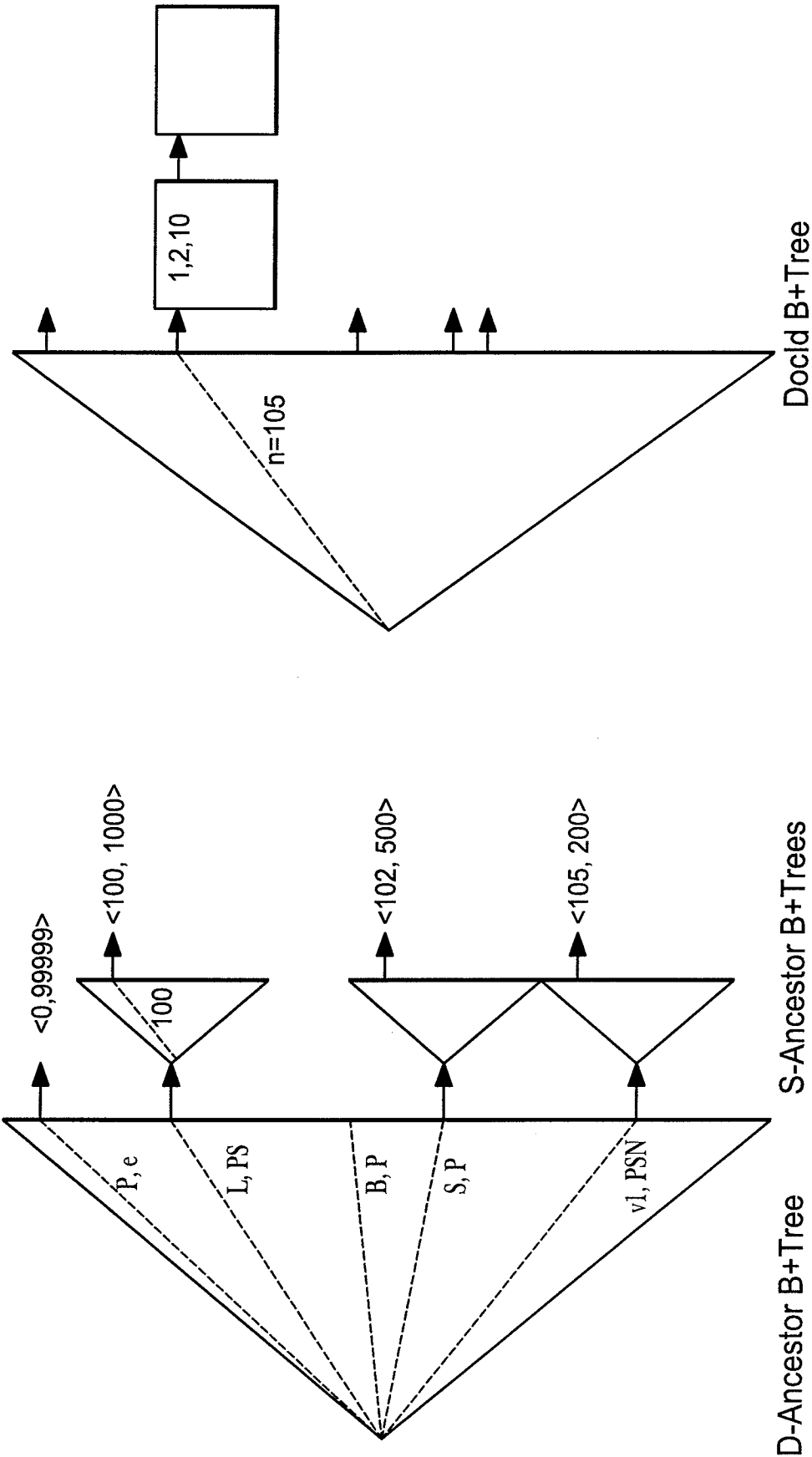


FIG. 6

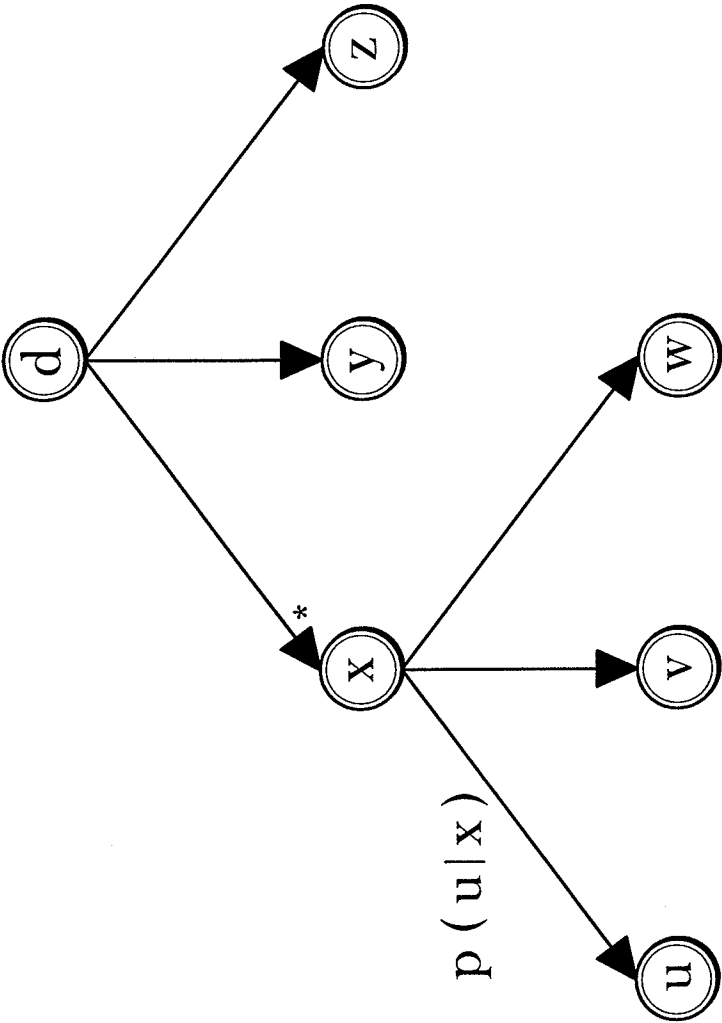


FIG. 7

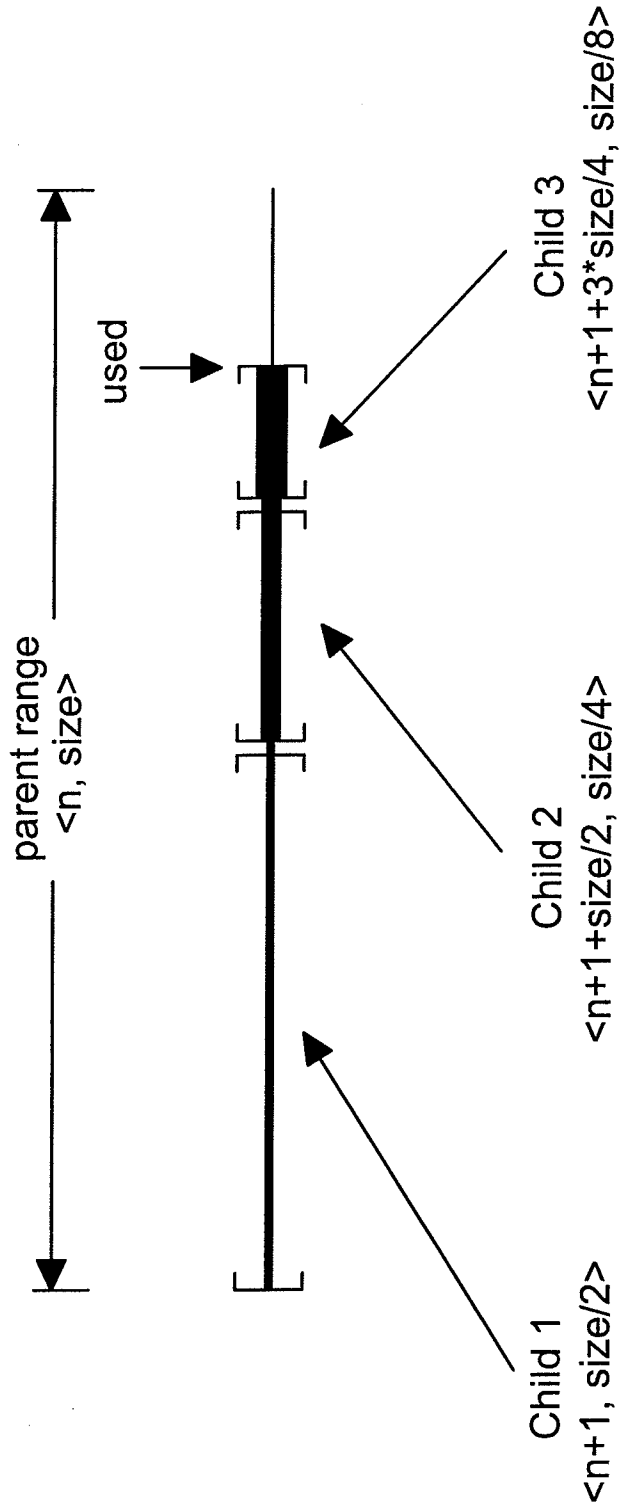
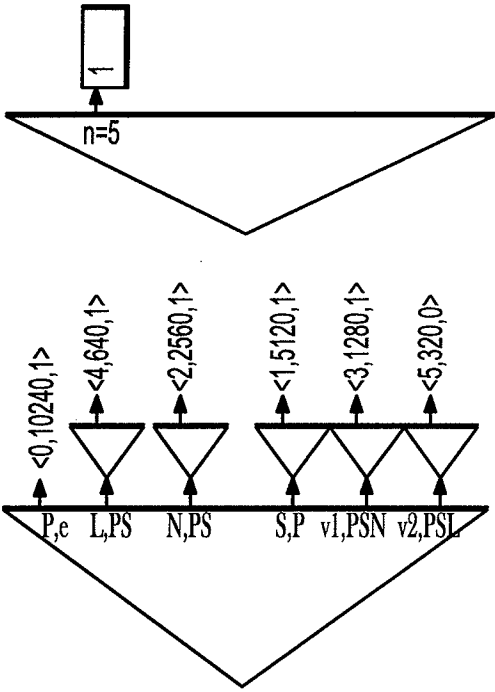
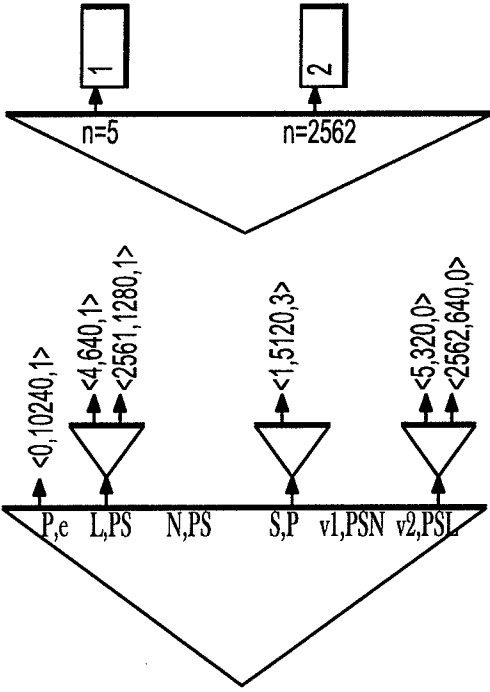


FIG. 8



(a) Index containing Doc_1



(b) Changes caused by the insertion of Doc_2

FIG. 9